

#3A
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Preliminary Amendment

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1. An imaging system [(1)] for imaging a non-planar developable surface [(30)], the system [(1)] comprising a processor [(25)] linked to an imaging detector [image capture means (2)] and being capable of: capturing at least one image [(31,33)] of the surface [(30)], said image [(31,33)] having a warp corresponding to the non-planar surface; and of generating therefrom a first set of points [(95)] representing the three-dimensional profile of the non-planar surface relative to a planar reference surface [(12)], wherein [characterised in that] the processor [(25)] is arranged to fit to the first set of points [(95)] a second set of points [(117)] representative of a developable mesh [(110)] and to use the second set of points [(117)] to texture-map the image [(150,154,160)] in order to de-warp the image [(32)].

2. A method of imaging a non-planar developable surface [(30)] using an imaging system [(1)] comprising a processor [(25)] linked to an imaging detector [image capture means (2)], comprising the steps of:

i) capturing at least one image [(31,33)] of the surface [(30)], said image having a warp corresponding to the non-planar surface [(30)];

ii) generating from the image [(31,33)] a first set of points [(95)] representing the three-dimensional profile of the non-planar surface [(30)] relative to a planar reference surface [(12)];

[characterised in that] wherein the method comprises the steps of:

5 iii) fitting to the first set of points a second set of points [(117)] representative of a developable mesh [(110)]; and

10 iv) using the second set of points [(117)] to texture-map [(150,154,160)] the image [(31,33)] in order to de-warp the image.

15 3. A method as claimed in Claim 2, in which in step iii) the mesh [(133)] is distorted as the second set of points [(117)] is fit to the first set of points [(95)] to the extent that the mesh [(133)] is no longer developable, following which the distorted mesh [(133)] is relaxed [(140)] to a developable state.

20 4. A method as claimed in Claim 3, in which prior to step iii) an initial surface [(130)] is fit to the first set of points, and in step iii) the mesh [(133)] is fit to the initial surface [(130)].

25 5. A method as claimed in Claim 4, in which the initial surface [(130)] is a developable surface, and in which after fitting of the mesh [(133)] to the initial surface [(130)] at least some of the second set of points [(117)] are moved [(132)] closer to corresponding ones of the first set of data [(95)] points during which the mesh [(133)] is
30 distorted.

6. A method as claimed in Claim 3 [any of Claims 3 to 5], in which points [(134)] in the second set of points are not

fit to the first set of points [(95)] if said points [(134)] in the second set of points do not correspond closely enough to any of the points in the first set of points [(95)].

5 7. A method as claimed in Claim 3 [any of Claims 3 to 6], in which the relaxation of the mesh [(140)] takes place in an iterative process in which the second set of points [(117)] is adjusted incrementally until distances between points in the second set of points are equalized.

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8. A method as claimed in Claim 2 [any of Claims 2 to 7], in which the non-planar developable surface is a curled document [(30)].

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9. A method as claimed in Claim 8, in which the extent of the document [(30)] is estimated by fitting a rectangle [(124)] around extreme points [(126,128)] of the first set of points [(95)].

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10. A method as claimed in Claim 8 [or Claim 9], in which the imaging detector [image capture means (2)] projects a structured light pattern [(26)] that forms separated light stripes [(35)] across the non-planar developable surface [(30)], the first set of points [(95)] being generated from
25 the light stripes [(35)].

11. A method as claimed in Claim 10, in which step ii) includes the steps of:

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a) creating a difference image by taking a difference between an image captured with the stripes [(33)] and an image captured without the stripes [(31)];

b) thresholding the difference image to discard portions below a threshold;

5 c) counting detected stripes across the difference image in order to identify individual stripes [(35)];

d) triangulating [(84)] the image of the non-planar surface at points [(86)] corresponding with identified
10 stripes [(35)] to generate the first set of points [(95)].
